

**What is Claimed Is:**

1. A method for forming a textile structure comprising the steps of:

5 spiral winding machine direction (MD) yarns to form a system having a defined width; and  
depositing a pattern of cross machine direction (CD) elements onto said system of MD yarns.

2. The method of claim 1, wherein the CD  
10 elements connect the MD yarns so to fix their position and stabilize the structure.

3. The method of claim 1, wherein the MD yarns are intermittently encapsulated by the CD elements  
15 along the length of the MD yarns.

4. The method of claim 1, wherein the CD elements extend the full width of said MD yarn system.

20 5. The method of claim 1, wherein the CD elements extend less than the full width of said MD yarn system.

25 6. The method of claim 1, wherein the textile structure formed is a forming, press, dryer, TAD, pulp forming, sludge filter, chemiwasher, or engineered fabric.

30 7. The method of claim 1, wherein said CD elements are created on said MD yarn system by

depositing a polymer resin orthogonally thereto on one or both surfaces thereof so to obtain a system of CD elements interlocking with the MD yarns.

5           8.    The method of claim 7, wherein the pattern created on the MD yarn system is varied by controlling said deposition of said polymer thereon.

          9.    The method of claim 8, wherein a speed of  
10 said deposition is controlled so as to adjust the amount of polymer on said MD yarn system.

          10.   The method of claim 7, wherein the polymer is delivered using one or more dispensers.

15           11.   The method of claim 7, wherein the polymer is delivered to both surfaces of the MD yarn system so to join and subsequently bond the MD yarn system therebetween.

20           12.   The method of claim 7, wherein the deposited polymer is curable by one of UV light or heat.

          13.   The method of claim 12, wherein the deposited  
25 polymer is subsequently cured to obtain a solid system of CD elements.

          14.   The method of claim 7, wherein the deposited  
polymer is molten polymer and is subsequently cooled to  
30 obtain a solid system of CD elements.

15. The method of claim 14, wherein the molten polymer is derived by melting monofilament used as feedstock.

5        16. The method of claim 1, wherein said CD elements are created on said MD yarn system by positioning CD monofilaments orthogonally thereto on one or both surfaces thereof; heating said CD monofilaments so they distort; and cooling said CD  
10 monofilaments to obtain a system of CD elements mechanically interlocking with the MD yarns.

17. The method of claim 16, wherein the CD monofilaments are positioned on both sides of the MD  
15 yarn system so to join and bond said MD yarn system therebetween.

18. The method of claim 16, wherein said CD monofilaments are bondable whilst maintaining its  
20 functional strength.

19. The method of claim 16, wherein said polymer is one of MXD6 and poly-m-xylylene adipamide.

25        20. The method of claim 16, wherein said CD monofilaments are bicomponent monofilaments having a sheath and a core, and the sheath has a melting point lower than the core.

30        21. The method of claim 1, wherein the textile structure formed is machine seamable or endless.

22. A device for spirally winding a system of MD yarns comprising:

5 a first roll and a second roll, said rolls mounted horizontally and being parallel to each other;

turn around means positioned in parallel between the first and second rolls and in the plane defined by the top surfaces of the two rolls, said turn around means including a first row of pins and a second row of  
10 pins; and

whereby a yarn attached to a first pin at one end of the first pin row is unwound orthogonal to the rolls, initially contacting the top of the first roll and then spiraling around the bottom of said first  
15 roll, said yarn being further unwound orthogonal to said rolls so to first contact the bottom of the second roll and then spiraling around the top of said second roll, said yarn being further unwound orthogonal to said rolls and then looping around a second pin at one  
20 end of the second pin row, and said yarn being further unwound toward the second roll in a similar fashion so that said spiral winding is repeated until a system of MD yarns of a desired width is formed.

25 23. A device for forming a seam in a spirally wound system of MD yarns, comprising:

a first row of pins and a second row of pins opposing said first row, each pin having an opening therethrough; and

30 a moveable pintle for sliding through said pin openings, wherein respective MD yarns are successively

positioned between respective pairs of adjacent pins, the pintle is slid forward so to capture the yarn, and the process is repeated until a seam is formed.

5           24. A device for forming a seam in a spirally wound system of MD yarns, comprising:

          a first row of vertically mounted pins; and

          a second row of vertically mounted pins, said second row opposite and parallel to said first row,  
10 wherein after each respective MD yarn is looped over a corresponding pin, said pin is rotated into a horizontal position so to lock the yarn in place for a finished seam.

15           25. A device for spirally winding a system of MD yarns comprising:

          a first roll and a second roll, said rolls mounted horizontally and being parallel to each other,

          whereby a yarn is unwound orthogonal to the rolls,  
20 initially contacting the top of the first roll and then spiraling around the bottom of said first roll, said yarn being further unwound orthogonal to said rolls so to first contact the bottom of the second roll and then spiraling around the top of said second roll, said yarn  
25 being further unwound orthogonal to said rolls toward the first roll in a similar fashion so that said spiral winding is repeated until a system of MD yarns of a desired width is formed.

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26. A textile structure made in a manner comprising the steps of:

spiral winding machine direction (MD) yarns to form a system having a defined width; and

5 depositing a pattern of cross machine direction (CD) elements onto said system of MD yarns.

27. The textile structure claimed in claim 26, wherein the CD elements connect the MD yarns so to fix  
10 their position and stabilize the structure.

28. The textile structure claimed in claim 26, wherein the MD yarns are intermittently encapsulated by the CD elements along the length of the MD yarns.

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29. The textile structure claimed in claim 26, wherein the CD elements extend the full width of said MD yarn system.

20 30. The textile structure claimed in claim 26, wherein the CD elements extend less than the full width of said MD yarn system.

25 31. The textile structure claimed in claim 26, wherein said CD elements are created on said MD yarn system by depositing a polymer resin orthogonally thereto on one or both surfaces thereof so to obtain a system of CD elements interlocking with the MD yarns.

30 32. The textile structure claimed in claim 31, wherein the pattern created on the MD yarn system is

varied by controlling said deposition of said polymer thereon.

33. The textile structure claimed in claim 32,  
5 wherein a speed of said deposition is controlled so as to adjust the amount of polymer on said MD yarn system.

34. The textile structure claimed in claim 31,  
wherein the polymer is delivered using one or more  
10 dispensers.

35. The textile structure claimed in claim 31,  
wherein the polymer is delivered to both surfaces of the MD yarn system so to join and bond the MD yarn  
15 system therebetween.

36. The textile structure claimed in claim 31,  
wherein the deposited polymer is curable by one of UV light or heat.  
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37. The textile structure claimed in claim 36,  
wherein the deposited polymer is subsequently cured to obtain a solid system of CD elements.

25 38. The textile structure claimed in claim 31,  
wherein the deposited polymer is molten polymer and is subsequently cooled to obtain a solid system of CD elements.

30 39. The textile structure claimed in claim 38,  
wherein the molten polymer is derived by melting monofilament used as feedstock.

40. The textile structure claimed in claim 26,  
wherein said CD elements are created on said MD yarn  
system by positioning CD monofilaments orthogonally  
5 thereto on one or both surfaces thereof; heating said  
CD monofilaments so they distort; and cooling said CD  
monofilaments to obtain a system of CD elements  
mechanically interlocking with the MD yarns.

10 41. The textile structure claimed in claim 40,  
wherein the CD monofilaments are positioned on both  
sides of the MD system so to join and bond said MD yarn  
system therebetween.

15 42. The method of claim 40, wherein said CD  
monofilaments are a polymer able to be bondable whilst  
maintaining its functional strength.

20 43. The textile structure claimed in claim 40,  
wherein said polymer is one of MXD6 and poly-m-xylylene  
adipamide.

25 44. The textile structure claimed in claim 40,  
wherein said CD monofilaments are bicomponent  
monofilaments having a sheath and a core, and the  
sheath has a melting point lower than the core.

30 45. The textile structure claimed in claim 26,  
wherein the textile structure formed is machine  
seamable or endless.

46. The textile structure claimed in claim 26,  
wherein the textile structure formed is a forming,



press, dryer, TAD, pulp forming, sludge filter, chemiwasher, or engineered fabric.

47. The textile structure claimed in claim 26,  
5 wherein the MD yarns are capable of being infinitely spaced apart or close together.

48. The textile structure claimed in claim 26,  
wherein the CD elements contribute to fabric stability  
10 and other functional characteristics such as permeability to air and/or water, structural void volume or caliper.

49. The textile structure claimed in claim 26,  
15 wherein materials used as the CD element are not readily extrudable.

50. The textile structure claimed in claim 26,  
wherein the CD elements acts as shute runners on a wear  
20 side of the structure, protecting the MD yarns.

51. The textile structure claimed in claim 26,  
wherein high abrasion resistant polymers are used as the CD element material.  
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52. The textile structure claimed in claim 26,  
wherein a layer of batt is affixed to one or both sides of the structure.

53. The textile structure claimed in claim 26,  
wherein one or more nonwoven layers are laminated to  
the textile structure with or without batt.

5 54. The textile structure claimed in claim 26,  
wherein the textile structure is permeable.

55. The textile structure claimed in claim 26,  
wherein said textile structure has a smooth sheet  
10 contact side.

56. The textile structure claimed in claim 26,  
which includes a resin coating rendering said textile  
structure impermeable.

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